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## Clinical Laboratory

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# Clinical Laboratory

## An aid to diagnosis

James B. Flanary, fall '43

VETERINARIANS in recent years have come to realize that certain laboratory facilities are almost a necessity for accurate diagnosis of many disease conditions. The laboratory findings serve to supplement clinical symptoms, thereby leading to a more intelligent diagnosis. With a microscope and other laboratory equipment definite diagnosis may be established in cases which lack conclusive clinical symptoms. Only the more practical features of interest to a practicing veterinarian will be discussed, although there are numerous ramifications possible in a fully equipped clinical laboratory.

Microscopic examination for evidence of parasitism is one of the best known examples of laboratory diagnostics. Particularly in small animal medicine is this important because the living habits of dogs and cats may predispose them to heavy infections with internal parasites. By examining the feces under the microscope one can usually determine the type of gastro-intestinal parasitism present by locating the ova or oocysts eliminated. The sugar flotation method is one of the commonest ways of preparing feces for examination. After the parasite has been identified proper treatment may be prescribed. Examination for parasites is of especial importance in differentiating parasitism from bacterial infections which show similar symptoms.

In dogs and cats the primary purpose of fecal examinations is to distinguish between the main types of intestinal parasites, i.e., to determine whether the patient is infected with ascarids, tapeworms, coccidia, hookworms, or whipworms. However, the species must also be identified

in order to prescribe proper control measures. An example of this is the necessity of also treating a patient that is infected with *Dipylidium caninum* for fleas and biting lice in order to interrupt the life cycle of this particular tapeworm.

A survey made in the clinical laboratory at the Stange Memorial Clinic of the types of internal parasites in dogs as determined by fecal examination over a period of three years illustrates the various parasitisms found.

Parasite	Average No. of cases per year
1. <i>Ancylostoma caninum</i>	160
2. <i>Toxocara canis</i>	108
3. <i>Isospora</i> sp.	90
4. Tapeworms	61
5. <i>Toxascaris leonina</i>	29
6. <i>Trichuris vulpis</i>	16

Fecal examination in large animals has not yet become the routine procedure as seen in small animals, but all evidence seems to indicate its more universal adoption, particularly in cases showing evidence of extreme parasitism. Unthriftiness, anemia, emaciation, lack of condition, and lowered vitality are symptoms which indicate the need for fecal examination.

Another important phase of laboratory diagnosis is the examination of skin scrapings for the presence of external parasites. Since infestations with ticks, lice, and fleas can usually be detected grossly, the problem resolves itself into one of ascertaining whether mange mites are the etiologic agents responsible. Although lesions of mange are fairly diagnostic, still one should confirm this diagnosis by skin

scraping. The elongated mite, *Demodex folliculorum*, is readily recognized and is a very frequent cause of mange lesions on the dog. Psoroptic, sarcoptic, chorioptic, notoedric, and otodectic mites are also frequently encountered and should be definitely recognized.

Otodectic mange infesting the ear canals of dogs, foxes, cats, and rabbits is often seen and is best differentiated from bacterial infection by microscopic examination.

### Fungi

Another skin condition which must be considered is the type caused by fungi, including those associated with so-called ringworm. Preparation of skin scrapings for such examination requires a special technique.

The only certain clinical method of diagnosing infection with heartworms (*Dirofilaria immitis*) in the dog is by microscopic examination of the animal's blood for the presence of the larvae.

A modern clinical laboratory should be equipped so that cultures may be made in order to ascertain the microorganism responsible for the disease in question. In cases of bovine mastitis the exudate or milk should be cultured for the purpose of identifying the etiologic agent. Only by knowing the organism producing the udder infection can a veterinarian be sure he is prescribing the proper therapy. This eliminates the "hit and miss" type of treatment. The most common use made of culturing in small animal medicine is that done for the purpose of identifying staphylococcic dermatitis.

Smears are taken also from exudate of abscesses in cattle to differentiate those caused by *Actinomyces bovis* and *Actinobacillus lignieresii* from those of *Corynebacterium pyogenes*.

### Blood Counts

Blood counting has had wide acceptance in small animal practice and is an exceedingly valuable guide in diagnosis. The foremost utilization of blood counts is for the help they render in diagnosis of obscure diseases. The nature of an infection is often demonstrated by making

a differential leucocyte count. An excess of immature leucocytes may indicate the severity of the infectious process. Extensive use of the differential blood count is made in diagnosing metritis in dogs, particularly in cases which show few clinical symptoms. Panleucopenia of cats is characterized by a pronounced decrease in the number of leucocytes in the blood, therefore a blood count is very helpful.

Leucocyte counts are a necessity in diagnosing leucemias and leucoses. Leukemia, characterized by an increase of lymphoid or granulocyte cells in the blood stream as a result of hyperplasia of lymphoid or myeloid tissue must be differentiated from pseudoleukemia in which there is a hyperplasia of these tissues but no increase in the white cells of the blood.

The occasion not infrequently arises when it is desirable to know the coagulation time of a patient's blood in order to determine if he is a so-called "bleeder". Coagulation time is easily calculated in the laboratory with a capillary glass tube. Hemoglobin determination also is frequently necessary and is accomplished by using a hemoglobinometer.

### Anemia

Although anemia is generally revealed by gross clinical examination, nevertheless, the diagnosis should be verified by an erythrocyte count. From there one may proceed to study the etiology of the anemia in an intelligent and systematic manner. Blood smears may aid the diagnostician by exposing changes in cells characteristic of certain anemic diseases. Fecal examination might reveal the presence of blood-sucking parasites. Blood protozoa may be located by means of a stained blood smear.

Indication of pathologic conditions in the urinary system as well as disturbance of the general body metabolism is gained by urine analysis. The presence of blood, sugar, albumin, or bile salts points to some urinary, pancreatic, hepatic, or intestinal disturbance, the determination of which is aided by observing those abnormal constituents present in the urine and their relative quantities. A knowledge of

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the reaction of urine is often useful in prescribing treatment for urinary calculi in dogs. Microscopic examination of centrifuged urine yields much fruitful information. Use is made of this in examining urine from cows suspected of having infectious pyelonephritis. The presence of acetone bodies in the urine is frequently found in acetonemia of cattle.

Semen examination is employed for both large and small males. Although motility of the sperms does not necessarily mean fertility, lack of sperm motility

definitely indicates that the animal is sterile.

Lastly, serologic tests may be conducted in the laboratory. One occasionally finds it necessary to run an agglutination test on dog's blood for leptospirosis. Agglutination tests for brucellosis of cattle and swine and for pullorum disease of chickens are widely used.

Below is a summary of the examinations performed in the Veterinary Clinical Laboratory at the Stange Memorial Clinic for the year 1942. It shows a fairly typical cross-section of the possibilities in the use of a clinical laboratory as an adjunct to diagnosis.

SUMMARY OF EXAMINATIONS—1942

	Horses and Mules	Cattle	Sheep and Goats	Swine	Dogs	Cats	Rabbits	Totals
Blood counts .....	12	14		5	119	4		154
Blood parasites .....					12			12
Cultures .....	1	5			29	1		36
Ear exudate for parasites .....						5	1	6
Fecal examination .....	29	53	41	3	1007	51		1184
Semen examination .....	2				1			3
Serology .....					4			4
Skin for parasites .....	1	1	1		162	6		171
Urine analysis .....	2	24			52			78
Total .....	47	97	42	8	1386	67	1	1648

## MURRAY

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drafted, if necessary. A few more were lost by "jumping the gun" and enlisting, but no more were taken by selective service.

In the late winter of 1942, it became apparent that taking part in the college "speed-up" program was inevitable, so he arranged for the year-round education of veterinary students at Iowa State College for the first time in the history of the institution. Keeping in continuous contact with the headquarters of the Seventh Corps Area, the Surgeon-General's office in Washington, D. C., and continually attempting to forestall the local selective service board, kept his nerves constantly on edge for those months of anxious waiting. In March, a

meeting with the local board, Col. R. J. Shaw from the state selective service board and the college advisory officers resulted in the promise of deferment for veterinary students.

Whenever the slightest inkling of good news came through, or whenever official word was destined to change the status, he would make it known through postings on the bulletin board or through convocation, presenting all the facts that came to him, and attempting to clarify any points that were confusing. When, in May of last year, it was announced that all the classes of the veterinary division would be given blanket appointments as Second Lieutenants in the Medical Administrative Corps on an inactive status, one would have thought that Dean Murray could "take it easy" for a while. That was far from the case, as in addition